DOE Computer Graphics Forum
2012 Site Survey

Site Name: Sandia National Laboratories

Site Division or Group: Scalable Analysis & Visualization (1461) & Scientific Applications and User Support (9326) and Scientific Computing System (9328)

Site Representative: W. Alan Scott

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Group Overview

Mission:

1461 Mission:
We provide the scientific community with innovative, leading-edge scalable analysis and visualization solutions that enable understanding of complex data. By collaborating directly with customers, we deliver targeted technologies that help them explore, understand, and communicate information.

9326 Mission:
The department provides user and application support in conjunction with Sandia's scientific, high performance computing environment.
The department provides and/or supports certain application-level software and expertise to applications to enable effective use of high performance computing technologies.
It provides user environments that enable the use of scientific computing, and it provides direct support to users of scientific computing.

9328 Mission:
We provide a range of services to support customers who solve large, complex engineering and science problems; visualize and interpret results; and manage and retain information.

Past Year's Activities:

ParaView 3.12.0 development and deployment (100 repeat users per month)
ParaView 3.12.1 development and deployment (100 repeat users per month)
ParaView 3.14.0 development and deployment (100 repeat users per month)
ParaView 3.14.1 development and deployment (100 repeat users per month)
EnSight 9.2.2(d) deployment (215 users)
Provided direct and indirect visualization support for EnSight and ParaView users
Developed scalable I/O software solutions for VTK/ParaView.
Continued development of Titan framework.

Plans and Priorities:

Continue ParaView development
Continue direct and indirect visualization support
Deploy and support ParaView on Cielo

Funding Sources

Advanced Simulation and Computing (ASC), Data Visualization Science (DVS)
SciDAC-2
LDRD
CSRF
NGIC
ASCR Scientific Data Management and Analysis at Extreme Scale.

Current Resources

Hardware:

Redsky:
Redsky provides interactive visualization, data analysis, and archival storage for unclassified output from compute nodes on Redsky, Glory and other institutional clusters. Redsky's visualization nodes presently consist of a 64 node partition of Redsky. Graphics rendering is done using software Mesa. Redsky consists of 2823 nodes, with each node made up of dual socket/ quad core chips, for a total of 22,584 cores – forming a 264 TFlop cluster. Each core has 1.5 GByte of memory, for a total of 33,876 GBytes of memory. 2PBytes of scratch data storage is attached to Redsky (combined, unclassified and classified systems).

Redsky-s:
Redsky-s provides interactive visualization, data analysis, and archival storage for classified output from compute nodes on Redsky-s, Unity, Whitney and other institutional clusters. Redsky's visualization nodes presently consist of a 16 node partition of Redsky-s. Graphics rendering is done using software Mesa. Redsky-s consists of 519 nodes, with each node made up of dual socket/ quad core chips, for a total of 4,152 cores – forming a 48 TFlop cluster. Each core has 1.5 GByte of memory, for a total of 6,228 GBytes of memory.

Cielo:
Cielo provides interactive visualization, data analysis, and archival storage for handling classified output from compute nodes on Cielo. Visualization nodes on Cielo presently consist of a 376 node partition, with each node containing two 8 core AMD Opteron processors and 64 GB of memory. Graphics rendering is done using software Mesa. Cielo consists of 8518 compute nodes (136,288 cores), each node having 32 GBytes of memory. Total system memory is 297 TBytes. Peak computation speed is 1.37 Petaflops.

MESA WIF VIEWS Corridor:
8-MegaPixels of onscreen real estate (3840x2160 pixels -- 4 times HD)
High-resolution screen driven by either Windows or Linux
Stereo visualization at 8 MP
3-tile ART Table for horizontal display (review of drawings, etc)

Client hardware support:
Linux, PC, and Macintosh desktops

Software:
EnSight 9.2.2(d)
ParaView 3.14.1

Staff:
David Rogers (Mgr 1461)
• Patricia Crossno
• Nathan Fabian
• Ken Moreland
• Thomas Otahal
• Tim Shead
• Andrew Wilson
• Brian Wylie

Dino Pavlakos (Mgr 9326)
• Russ Adams
• John Greenfield
• Warren Hunt
• Lisa Ice
• David Karelitz
• Alan Scott

John Noe (Mgr 9328)
• Sophia Corwell
• Steve Monk

Planned Growth

Hardware Acquisitions
Chama / Pecos:

1232 node, two sockets per node, 8 cores per socket. 32GByte of memory will be on each node. Visualization will initially be done on Chama/Pecos, but will migrate to Redsky/ Redsky-s as disks are cross-mounted.

Software Acquisitions
Unknown

Personnel Acquisitions
Unknown

Additional Comments
Continue address scaling issues for interactive ParaView on Cielo
Continue to build in-situ visualization capabilities
> Continue integration with Sandia simulation codes
> Partner with I/O experts to interface with staging capabilities